

**NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594**

SUMMARY OF AIRFRAME AND ENGINE EXAMINATION

WPR21LA086

A. ACCIDENT

Location: Spanish fork, Utah
Date: 1/13/2021
Time: 1315 MDT
Aircraft: [Hughes 269C (S/N 170570) N7480F]

B. PARTICIPANTS

David Bowling
Senior Air Safety Investigator
National Transportation Safety Board
Denver, Colorado

Troy Helgeson
Air Safety Investigator
Lycoming Engines
Milliken, Colorado

David Beard
A&P Mechanic
Beegles Aircraft Service, LLC
Greeley, Colorado

C. ACCIDENT SUMMARY

On January 13, 2021, about 1350 mountain standard time, a Hughes 269C helicopter, N7480F, was substantially damaged when it was involved in an accident near Spanish Fork, Utah. The instructor and pilot receiving instruction were not injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 instructional flight.

According to the flight instructor, they performed an uneventful preflight inspection, started the helicopter and transitioned into a hover. The pilot receiving instruction reported that during the engine run-up, which was performed at 2,500 rpm, they reduced engine power to idle and observed normal rotor and rpm separation. The instructor stated that after departure they

entered the airport traffic pattern where they performed several landings and three autorotative maneuvers at the airport. They subsequently departed the airport traffic pattern and flew to a nearby practice area west of the airport. After performing two recoveries from settling with power, they elected to return to the airport. During cruise flight at 6,500 ft mean sea level, 1,500 ft above ground level (agl), the instructor decided to practice a simulated engine failure and decreased power to idle as he announced to the pilot receiving instruction that they had lost power. The pilot receiving instruction lowered the collective to enter an autorotative maneuver and selected a landing site when prompted by his instructor. As the helicopter descended to 500 ft agl, the instructor advised the pilot receiving instruction to recover, but was unsuccessful in his attempts to restore power. The instructor immediately took control of the helicopter and attempted an air restart but was unsuccessful. He flared the helicopter as it passed below 30 ft agl to reduce airspeed and the helicopter's rate of descent. The instructor then raised the collective to arrest their descent further before impact, but the helicopter had about 7 mph of forward movement as it contacted the soft ground. The helicopter nosed over, and the main rotor blades contacted the tailboom, which separated from the helicopter. The front right skid tube broke, and the helicopter rolled onto its right side before it came to rest.

The helicopter was retained for further examination.

D. DETAILS OF AIRFRAME AND ENGINE EXAMINATION

Following the accident, the airplane was recovered and taken to Beegles Aircraft Services, LLC, Greeley, Colorado for storage. On June 30, 2021, an examination of the airframe and engine was conducted. It was led by an NTSB senior air safety investigator, with assistance from an air safety investigator from Lycoming Engines and an airframe and powerplant mechanic from Beegles Aircraft Services.

E. SUMMARY OF AIRFRAME EXAMINATION

Hughes 269C, [s/n 170570]

The helicopter cockpit, main rotor mast and rotorhead, and engine were secured upright to a trailer. The three main rotor blades had been cut and removed about 18 inches outboard of the hub and laid aside for inspection. One main rotor blade was bent at mid-span and about 12 inches inboard of the blade tip and showed nicks in the leading edge and scrapes across the top and bottom blade faces. The tail boom was sectioned into three pieces. One section showed an angular crush and cut where the main rotor blade made contact. The tail rotor and skid were separated at the gearbox. The tailrotor drive shaft turned freely, the control tube to the tail rotor was manipulated and moved the tail rotor pitch links properly. The right skid was broken at the right front leg. The remainder of the skid was removed. The right front cockpit Plexiglas and right cockpit door Plexiglas were broken out, cracked and fragmented. The left from cockpit Plexiglas was cracked and broken.

The control pedals were manipulated at the cockpit and showed continuity to the bellcrank and push-pull tube. The push-pull tube was traced through the tail boom to the tail

rotor. The cyclic was manipulated left and right and up and down. The main rotor head moved accordingly.



Figure 1, Helicopter on Trailer



Figure 2, Main Rotor Blades



Figure 3, Tail Rotor and Tail Skid



Figure 4, Tail Rotor Drive Shaft

The throttle was moved through its full range from idle to full. The throttle cable to the carburetor moved accordingly. The mixture knob was also manipulated from full lean to rich. The mixture cable moved accordingly. The fuel shutoff knob was found in the Pull-Off position. It was moved to the on position and the fuel shutoff cable and valve moved accordingly.

All 8 drive belts were intact and attached to the engine drive pulley to the rotor control pulley and Sprague clutch. Manipulation of the pulleys turned the main rotor and the tail rotor drive shaft. The 8 belts were marked with a "V" and cut so that the engine could be run without manipulation of the main and tail rotor drives.



Figure 5, Drive Belts

F. SUMMARY OF ENGINE RUN

Lycoming HIO-360-D1A, [s/n L-18046-1A], 190 hp

The helicopter and trailer were removed to the ramp. The helicopter was lifted so that jacks could be placed on the right side where the right skid would have been to level the helicopter. The helicopter was then strapped to the trailer to secure it for the engine run.

A 24-volt battery was installed, and 5 gallons of fuel were added to the fuel tank. No other preparatory action was done.



Figure 6, Helicopter Strapped to Trailer for Engine Run

The master switch and fuel boost pump were turned on. No fuel leaks were noted. The magnetos were placed to both, the mixture was moved to a position between rich and lean, and the engine was started. At first, the engine ran rough and oil smoke was observed at the exhaust. After a couple of minutes, the engine ran smoother. The engine was run for about 10 minutes at various rpm settings. With the throttle at idle, the engine rpm reduced to 500-750 rpm and would run rough to the point of the engine cutting out. Lycoming stated that the engine idle setting should be about 1,200 rpm. The throttle was increased to 2,400-2,500 rpm where the engine ran normally. The power was then reduced to approximately 1,800 rpm and the magnetos were checked. With the ignition switch turned to the left and then to the right magneto, the rpm reduced 300 rpms respectively. There was little rpm difference between the two magnetos. Manifold pressure fluctuated between 8 and 10 inches of Hg throughout the run. At lower power settings the MP would be about 8 inches. At the higher power settings, 10 inches was observed. The fuel pressure reading was 28 psi and the oil pressure reading was 90 psi (in the green arc) throughout the run. The engine was shut down normally.



Figure 7, Installed 24-Volt Battery